

Chapter 7 Similarity

7.1 Ratio and Proportion

Ratio—a comparison of two numbers

$$a:b \qquad \frac{a}{b}$$

Simplify the following ratios:

Example
1860 students
310 athletes

Athlete: student ratio

$$\frac{310}{1860} = \frac{31}{186} = \frac{1}{6}$$

Athlete: non-athlete ratio

$$310 : 1550$$

$$\frac{310}{1550} = \frac{1}{5}$$

Must convert to the same unit!

K H D Base D C M

2m 200



40cm

Length:width

$$\frac{200}{40} = \frac{20}{4} = \frac{5}{1}$$

Simplify

2 ft : 20 in

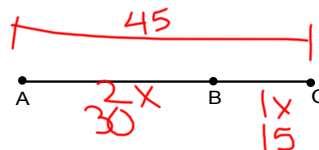
12 ft : 5 yd (3ft = 1yd)

$$24:20$$

$$12:15$$

$$4:5$$

$$\frac{24}{20} = \frac{12}{10} = \frac{6}{5}$$



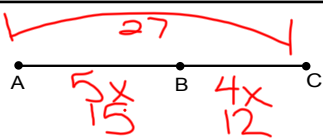
$$AC = 45$$

The ratio of AB:BC is 2:1.
Find AB and BC.

$$2x + x = 45$$

$$3x = 45$$

$$x = 15$$



$$AC = 27$$

AB:BC is 5:4

Find AB and BC.

$$5x + 4x = 27$$

$$x = 3$$

$$4(3) = 12$$

$$5(3) = 15$$

The ratio of the sides of a triangle are 5:12:13.
The perimeter is 90 cm. What are the lengths of the sides?

$$5x + 12x + 13x = 90$$

$$\begin{matrix} 15\text{cm} \\ 36\text{cm} \\ 39\text{cm} \end{matrix}$$

$$30x = 90$$

$$x = 3$$

The perimeter of a rectangle is 40ft.
The ratio of length to width is 8:2.
Find the length and the width.

$$l = 16ft \quad w = 4ft$$



$$8x + 2x + 8x + 2x = 40$$

$$20x = 40$$

$$x = 2$$

The perimeter of a rectangle is 32m.
The ratio of length to width is 5:3.
Find the length and the width.

$$x = 2$$

$$\begin{matrix} 10m \\ 6m \end{matrix}$$

$$5x + 3x + 5x + 3x = 32$$

$$\begin{array}{r} 16x = 32 \\ \hline 16 \quad 16 \\ x = 2 \end{array}$$

Proportion—equation stating 2 ratios =

$$\frac{a}{b} = \frac{c}{d}$$

“a is to b as c is to d”

Cross Product Property

Product of Means = Product of the extremes

$$\begin{array}{c} \frac{a}{b} \times \frac{c}{d} \\ bc = ad \end{array}$$

Solve the following proportions:

$$\frac{5}{3} \times \frac{20}{x}$$

$$\begin{aligned} 5x &= 20 \cdot 3 \\ 5x &= 60 \\ x &= 12 \end{aligned}$$

$$\frac{6}{18.2} = \frac{9}{y}$$

$$\begin{aligned} 6y &= 18.2 \cdot 9 \\ 6y &= 163.8 \\ y &= 27.3 \end{aligned}$$

$$\frac{(4x-5)}{3} = \frac{21}{9}$$

$$\frac{4(4x-5)}{9} = \frac{3 \cdot 21}{9}$$

$$4x - 5 = 7$$

$$\begin{aligned} 4x &= 12 \\ x &= 3 \end{aligned}$$

On a map, every 1.5 in corresponds to 4 mi.
If two towns are 6 in apart on the map,
what is their actual distance apart?

$$\frac{1.5 \text{ in}}{4 \text{ mi}} = \frac{6}{x}$$

$$1.5x = 24$$

$$x = 16 \text{ mi}$$

HW

p361-362

#s13-26all, 30-33all, 37-47odd